

Appl. No. 10/623,226  
Reply to Office action of June 16, 2004

**Amendments to the Claims:**

The listing of claims will replace all prior version, and listings, of claims in the application:

**Listing of Claims:**

Claims 1 – 21 (cancelled)

Claim 22 (currently amended): ~~The composition of claim 21, A composition for the~~  
detection of energy radiation comprising: a cerium doped lutetium yttrium orthosilicate mono  
crystal wherein the crystal includes: a monocrystalline structure of cerium doped lutetium  
yttrium orthosilicate,  $\text{Ce}_{2x}(\text{Lu}_{1-y}\text{Y}_y)_{2(1-x)}\text{SiO}_5$  where  $x =$  approximately 0.00001 to  
approximately 0.05 and  $y =$  approximately 0.0001 to approximately 0.9999.

Claim 23 (previously presented): The composition of claim 22 wherein  $x$  ranges from  
approximately 0.0001 to approximately 0.001 and  $y$  ranges from approximately 0.3 to  
approximately 0.8.

Claim 24 (previously presented): A method of making a scintillation crystal comprising the  
steps of:

- (a) mixing  $\text{Lu}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$ ,  $\text{CeO}_2$ ,  $\text{SiO}_2$  together to form a mixture;
- (b) heating the mixture;
- (c) interacting the heated mixture with an LSO seed crystal; and
- (d) growing an LYSO crystal from the interaction.

Claim 25 (previously presented): The method of claim 24 wherein  $\text{Lu}_2\text{O}_3$  is substantially  
pure.

Claim 26 (previously presented): The method of claim 24 wherein  $\text{Y}_2\text{O}_3$  is substantially  
pure.

Claim 27 (previously presented): The method of claim 24 wherein  $\text{SiO}_2$  is substantially pure.

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Claim 28 (previously presented): The method of claim 24, wherein the heating step includes: heating the mixture to a molten state.

Claim 29 (previously presented): The method of claim 24, wherein the growing step includes: separating said LYSO crystal from the melt and cooling said LYSO crystal.

Claim 30 (Currently Amended): A crystal scintillator comprising a transparent-single crystal of cerium-activated lutetium yttrium oxyorthosilicate having the general formula  $\text{Lu}_{(2-x-z)}\text{Y}_x\text{Ce}_z\text{SiO}_5$ , wherein  $0.05 \leq x \leq 1.95$  and  $0.001 \leq z \leq 0.02$ .

Claim 31 (previously presented): The crystal scintillator of claim 30, wherein  $0.2 \leq x \leq 1.8$ .

Claim 32 (Canceled).

Claim 33 (Canceled).

Claim 34 (Currently Amended): A scintillation detector, comprising:

- (a) A crystal scintillator comprising a transparent-single crystal of cerium-activated lutetium yttrium oxyorthosilicate having the general formula  $\text{Lu}_{(2-x-z)}\text{Y}_x\text{Ce}_z\text{SiO}_5$ , wherein  $0.05 \leq x \leq 1.95$  and  $0.001 \leq z \leq 0.02$ ; and
- (b) A photodetector optically coupled to said crystal scintillator for detecting light from said crystal scintillator.

Claim 35 (previously presented): The detector of claim 34, wherein said photodetector comprises a photomultiplier tube.

Claim 36 (Canceled)

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Claim 37 (Currently Amended): A scintillation detector, comprising:

- (a) a crystal scintillator comprising a transparent single crystal of cerium-activated lutetium yttrium oxyorthosilicate having the general formula  $\text{Lu}_{(2-x-z)}\text{Y}_x\text{Ce}_z\text{SiO}_5$ , wherein  $0.2 \leq x \leq 1.8$  and  $0.001 \leq z \leq 0.02$ ; and
- (b) a photodetector optically coupled to said crystal scintillator for detecting light from said crystal scintillator.

Claim 38 (previously presented): The detector of claim 37, wherein said photodetector comprises a photomultiplier tube.

Claim 39 (Canceled)